

A36080 072731.0202
PATENT**Claims**

1. (Currently amended) A cold hearth melting and refining arrangement comprising:
a cold hearth configured to hold a pool of molten material; and
a skull wing inhibiting configuration comprising an electron gun
~~configured to generate an electron beam;~~ and a programmable device coupled to the
electron gun,
wherein the skull wing inhibiting configuration programmable device and the electron
~~gun are configured so that~~ provides an ~~the~~ electron beam that sweeps along at least a
portion of the perimeter of the pool of molten material to inhibit formation of skull wings
at the edges of the pool of molten metal.
2. (Currently amended). The cold hearth melting and refining arrangement of
claim 1, ~~wherein the programmable device and the electron gun are configured so that the~~
~~electron beam sweeps continuously along at least a portion of the perimeter of the pool of~~
~~molten material. wherein the skull wing inhibiting configuration provides an electron~~
~~beam that continuously sweeps along at least a portion of the perimeter of the pool of the~~
~~pool of molten material to inhibit formation of skull wings at the edges of the pool of~~
molten metal.
3. (Currently amended). The cold hearth melting and refining arrangement
of claim 2, ~~wherein the electron beam circumscribes the portion of the perimeter of the~~
~~pool of molten material with a time period that is in the range of about one millisecond to~~
~~about several seconds.~~

BEST AVAILABLE COPY

A36080 072731.0202
PATENT

wherein the skull wing inhibiting configuration provides an electron beam that circumscribes the portion of the perimeter of the pool of molten material with a time period that is in the range of about one millisecond to about several seconds.

4. (Currently amended). The cold hearth melting and refining arrangement of claim 1, ~~wherein the programmable device and the electron gun are configured so that the electron beam sweeps along at least a portion of the perimeter of the pool of molten material in a step-and-scan mode wherein the skull wing inhibiting configuration provides an electron beam that sweeps along at least a portion of the perimeter of the pool of molten material in a step-and-scan mode.~~

5. (Currently amended). The cold heart melting and refining arrangement of claim 4 ~~wherein the skull wing inhibiting configuration provides an electron beam that has a dwell time of the electron beam at a spot between steps is in the range of about one millisecond to about hundreds of milliseconds.~~

6. (Currently amended). The cold hearth melting and refining arrangement of claim 1 wherein the skull wing inhibiting configuration provides an ~~the~~ electron beam that delivers energy to clear the portion of the perimeter of the pool of molten material of volatile impurities that evaporate from the pool of molten material and recondense on the perimeter.

7. (Currently amended). A method of cleaning a perimeter of a pool of molten material in a cold hearth melting and refining arrangement, comprising utilizing an electron gun to generate an electron beam; and

NY02:529872.1

BEST AVAILABLE COPY

-3-

A36080 072731.0202
PATENT

sweeping a portion of the perimeter of the liquid pool with the electron beam so that volatile impurities that evaporate from the pool of molten material and recondense on the perimeter are dispersed.

8. (new) The method of claim 7 wherein sweeping a portion of the perimeter of the liquid pool with the electron beam comprises continuously sweeping the electron beam along at least a portion of the perimeter of the liquid pool.

9. The method of claim 7 wherein sweeping a portion of the perimeter of the liquid pool with the electron beam comprises circumscribing the portion of the perimeter of the pool of molten material with the electron beam in a time period that is in the range of about one millisecond to about several seconds.

10. (new) The method of claim 7 wherein sweeping a portion of the perimeter of the liquid pool with the electron beam comprises sweeping the electron beam in a step-and-scan mode.

11. (new) The method of claim 10 wherein sweeping the electron beam in a step-and-scan mode comprises using an electron beam with a dwell time in the range of about one millisecond to about hundreds of milliseconds at a spot between steps.

12. (new) The method of claim 7 wherein sweeping a portion of the perimeter of the liquid pool with the electron beam comprises using an electron beam to deliver energy to clear the portion of the perimeter of the pool of molten material of volatile impurities that evaporate from the pool of molten material and recondense on the perimeter.

NY02:529872.1

BEST AVAILABLE COPY

- 4 -